

CLAIMS

1. A system for web inspection of a web, the system comprising:
- a plurality of smart cameras, each smart camera for detecting a plurality of web flaws from a streaming video signal, each smart camera having means for generating flaw image data and flaw location data;
- a host computer for controlling the low contrast web inspection system and for accepting and displaying the flaw image data and the flaw location data; and
- an ethernet for connecting the plurality of smart cameras to the host computer.
2. The system of claim 1, wherein each smart camera of the plurality of smart cameras comprises:
- a line scan camera for generating a pixel representation of a portion of the web;
- a lighting uniformity and pixel sensitivity correction means for correcting each pixel of the pixel representation and for providing a corrected pixel representation;
- a web edge detector for detecting at least one edge of the web;
- a multi-pipeline pre-processor for filtering the corrected pixel representation, the multi-pipeline preprocessor generating a prioritized data stream of potential flaws;
- a run length encoder for generating location data regarding a location of each group of the potential flaws in a cross direction;
- a blob detector for generating block data regarding the location of blocks of the potential flaws along a machine direction; and
- an inspect/reject analyzer for determining actual flaw data from the prioritized data stream of potential flaws.

3. The system of claim 2, wherein the multi-pipeline processor comprises:

- 2 a plurality of filters for averaging the corrected pixel representation over
a distance of the web along a machine direction of the web;
- 4 a plurality of adaptive background subtraction channels connected to the
plurality of filters;
- 6 a plurality of thresholds, each thresholder of the plurality of thresholds
connected to an output of an adaptive background subtraction
8 channel of the plurality of adaptive background subtraction
channels, each thresholder for grouping a subtracted pixel
10 representations; and
- 12 a priority logic circuit for prioritizing the outputs of each of the plurality of
thresholders.

4. The system of claim 3, wherein the plurality of filters comprises:

- 2 a background filter;
- a machine direction streak filter;
- 4 a cross direction streak filter; and
- a small flaw filter.

5. The system of claim 3, wherein the plurality of thresholds comprises:

- 2 a single pixel flaw detector;
- a uniformity detector;
- 4 a machine direction streak detector;
- a cross direction streak detector; and
- 6 a small flaw detector.

6. The system of claim 1, wherein each smart camera of the plurality of smart
cameras detects the plurality of web flaws from the streaming video signal at a
contrast approaching a signal noise level.

7. A method for low contrast web inspection of a web, the method comprising
the steps of:

providing at least on smart camera for inspecting at least a portion of the
web;
generating flaw image data and flaw location data;
transmitting the flaw image data and flaw location data over an ethernet;
displaying the flaw image data and flaw location data.

8. The method of claim 7, wherein the step of generating flaw image data and
flaw location data comprises the steps of:

generating a pixel representation of a portion of the web;
correcting the pixel representation for a lighting uniformity and a pixel
sensitivity;
filtering the corrected pixel representation utilizing a plurality of filters;
grouping the filtered corrected pixel representations to generate a
plurality of potential flaw data streams;
generating a prioritized data stream from the plurality of potential flaw
data streams;
generating cross direction location data regarding a location of the
prioritized data stream;
generating block data regarding the location of blocks of the prioritized
data stream along a machine direction; and
determining actual flaw data from the prioritized data stream of potential
flaws utilizing the cross direction location data and the block data.

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9. A method for generating a prioritized image data stream from a digitized
2 video stream of a web, the method comprising the steps:
- 4 averaging the digitized video stream over a distance of the web to
 generate an averaged background signal;
- 6 averaging the digitized video stream over a distance of the web along a
 machine direction of the web to generate a filtered machine
 direction signal ;
- 8 averaging the digitized video stream over a distance of the web along a
 cross direction of the web to generate a filtered cross direction
10 signal;
- 12 subtracting the averaged background signal from the filtered machine
 direction signal to generate a first pixel representation;
- 14 subtracting the averaged background signal from the filtered cross
 direction signal to generate a second pixel representation;
- 16 grouping the first and second pixel representations to generate at least
 two data streams of potential flaws; and
- 18 prioritizing the at least two data streams of potential flaws to generate the
 prioritized image data stream.

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